RE 250 Variable Area Flowmeter

Operating instructions HART® communication

WE'VE GOT HART FIELD COMMUNICATIONS PROTOCOL ABILITY

© MECON GmbH 04/2011 OI_RE250_HART_EN

MECON FLOW-CONTROL-SYSTEMS

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1 Safety instructions

1.1 General information

Important!

This manual is solely a supplement to the document »Operating instructions RE250«.

To prevent any injury to the user or damage to the device it is essential that you read the safety instructions in the »Operating instructions RE250« and observe it unconditionally.

The manufacturer is not liable for any damage resulting from improper or unintended use of these devices.

1.2 Certifications

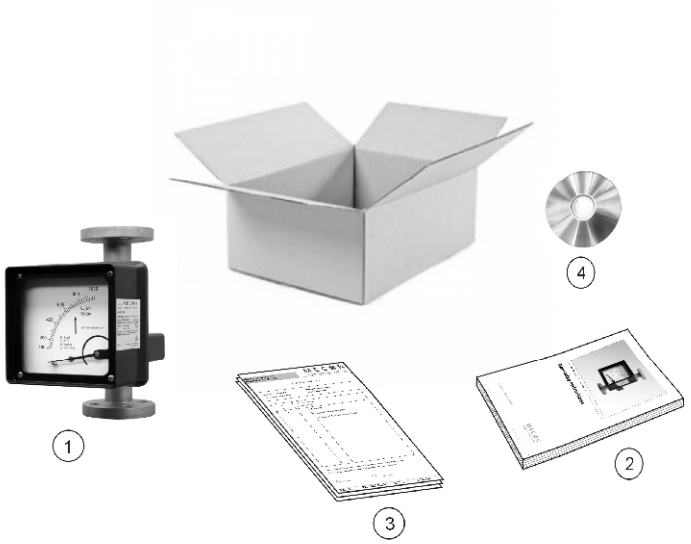
CE marking

The manufacturer certifies for the device RE 250 with integrated transducer MEM the fulfilment of all statutory requirements of the following EC directives by applying the CE marking:

- **Pressure equipment directive 97/23/EC**
- **Low voltage directive 2006/95/EC**
- **Guideline 2004/108/EC**
- **NAMUR recommendation NE21**

2 Device description

2.1 Scope of delivery



1 Flowmeter RE250 (with integrated transducer MEM)

2 Operating Instructions

3 Certificates (optional)

4 Software

Fig 2.1 **Scope of delivery**

Information!
Please check the delivery for completeness using the packing list.

2.2 Description code

The specific output configuration of the device can be taken from the description code:

RE 250 □ - □ □□□ □ - □□□ - □□ - □□□□□□

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

FA	**With HART protocol, 4 - 20mA**
FL	**With HART protocol, 4 - 20mA, 2 inductive contacts SJ 3,5N**
FJ	**With HART protocol, 1 inductive contact, 1 pulse output**

3 Installation

3.1 Notes on installation

Information!
All instruments are carefully checked for functional capability before distribution. On receipt of the device please carry out a visual inspection of the outer packing for damage or improper handling.

Please contact the carrier and your responsible sales field service if you should discover any defects. In such cases a description of the defect, the type and the serial number of the device is needed.

Information!
Unpack the equipment with care to prevent damage.

Information!
All instruments are carefully checked for order conformity.
Please check the delivery for completeness using the packing list. Please examine the flowmeter nameplate to verify that the device was built according to your order. Particularly check devices with electrical components for the correct supply voltage.

Information!
This manual is solely a supplement to the document »Operating instructions RE250«. To prevent any injury to the user or damage to the device it is essential that you read the installation notes in the »Operating instructions RE250« and observe it unconditionally.

3.2 Storage

- **Store the device in a dry and dust-free place.**
- **Keep away from direct sun and heat.**
- **Avoid external load to the device.**
- **The storage temperature range for standard devices with electrical components is about -40 ... +70 °C / -40 ... +158 °F.**

4 Electrical connections

4.1 Safety instructions

Warning!

All work on the electrical connections may only be carried out with the power disconnected.

It is essential to observe the voltage data on the nameplate.

Warning!

Observe all occupational safety regulations unconditionally.

Any work done on the electrical components of the device may only be carried out by a specialist.

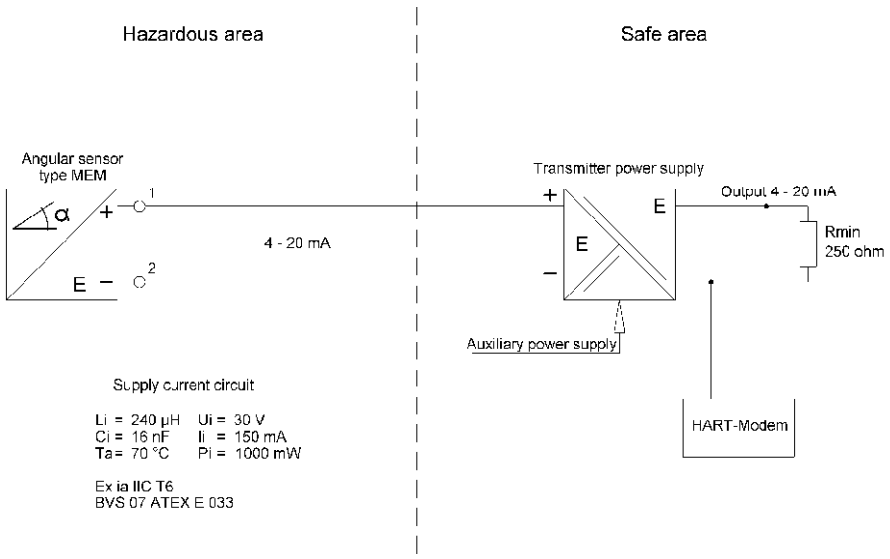
Caution!

After installation and any maintenance work on the device, the operator has to check and ensure the specified protection class again.

4.2 Electrical connections

4.2.1 Current output (MEM)

Fig 4.1 **Connection diagram for transducer MEM with current output**



4.2.2 Current output with digital outputs (MEM)

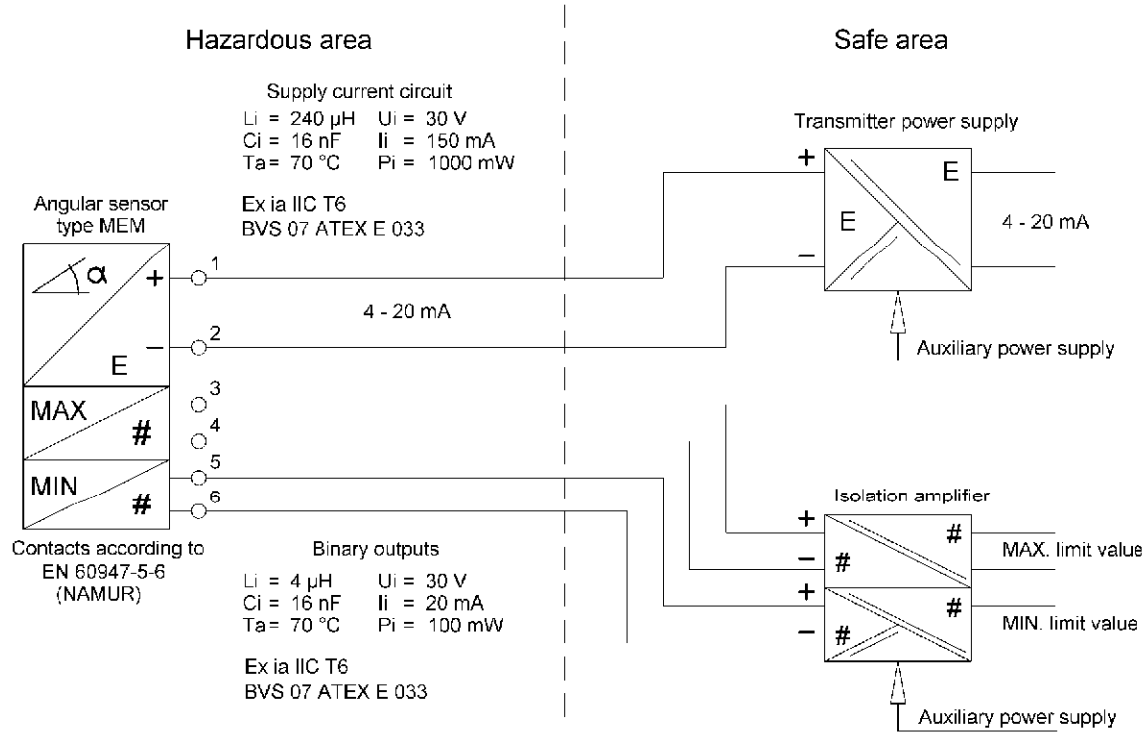
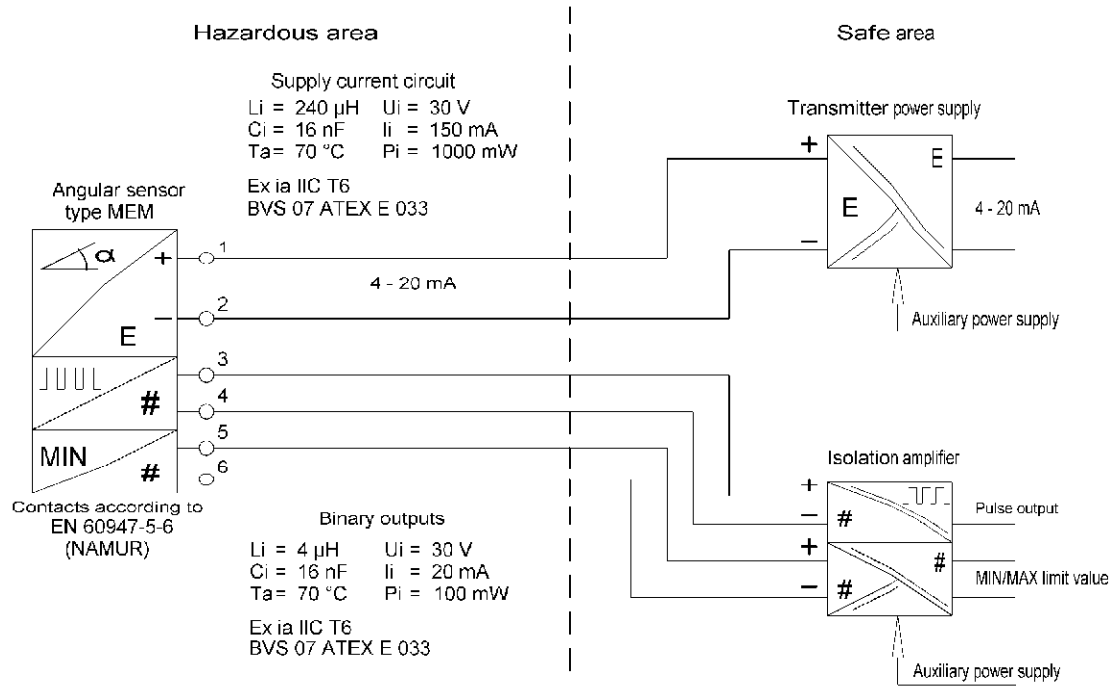

Hazardous area
Safe area
Supply current circuit
Li = 240 µH Ui = 30 V
Ci = 16 nF Ii = 150 mA
Ta = 70 °C Pi = 1000 mW
Ex ia IIC T6
BVS 07 ATEX E 033
Transmitter power supply
Angular sensor type MEM
4 - 20 mA
Auxiliary power supply
MAX
MIN
Isolation amplifier
MAX. limit value
MIN. limit value
Contacts according to EN 60947-5-6 (NAMUR)
Binary outputs
Li = 4 µH Ui = 30 V
Ci = 16 nF Ii = 20 mA
Ta = 70 °C Pi = 100 mW
Ex ia IIC T6
BVS 07 ATEX E 033
Auxiliary power supply

Fig 4.2 **Connection diagram for transducer MEM with 2 limit switches**


Hazardous area
Safe area
Supply current circuit
Li = 240 µH Ui = 30 V
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Ex ia IIC T6
BVS 07 ATEX E 033
Transmitter power supply
Angular sensor type MEM
4 - 20 mA
Auxiliary power supply
MIN
Isolation amplifier
Pulse output
MIN/MAX limit value
Contacts according to EN 60947-5-6 (NAMUR)
Binary outputs
Li = 4 µH Ui = 30 V
Ci = 16 nF Ii = 20 mA
Ta = 70 °C Pi = 100 mW
Ex ia IIC T6
BVS 07 ATEX E 033
Auxiliary power supply

Fig 4.3 **Connection diagram for transducer MEM with limit switch and pulse output**

5 Start-up

5.1 Device with current output (MEM)

The magneto-electrical measuring transducer (MEM) is completely factory-set when it is delivered to the customer.

After applying the supply voltage to the device, initially the current output will be about 3.5 mA to 4 mA for a few seconds. After that a current corresponding to the pointer deflection will flow.

Important!
Due to the influence of the float magnet, the MEM transducer will only output the correct current if the pointer position is caused by the float. Turning the pointer manually will cause incorrect values, but it's suitable for testing.

5.2 Device with additional limit switches

The limit switches are integrated into the angle transducer MEM and the design is according to NAMUR recommendation NE21.

The switching points can be set independently over the entire measuring range by a HART® command. For details please refer to chapter "xx".

Important!
Unless otherwise desired by the customer, the factory set value for the switching point is about 20 % / 80 % of URV and the switching function is active state »OPEN«.

5.3 Device with additional limit switch and pulse output

One of the integrated limit switches (design is according to NAMUR recommendation NE21) can be configured as a pulse output. The pulse unit is identical to the unit of the measured value.

The switching point of the second switch can be set independently over the entire measuring range by a HART® command. For details please refer to chapter "xx".

Important!
Unless otherwise desired by the customer, the factory set value for the switching point is about 40 % of URV and the switching function is active state »OPEN«.

6 Operation

6.1 Parameter setting using HART protocol

The parameter of the MEM can be set using a hand-held terminal or a PC using a suitable HART®-modem.

The following parameters can be set:

Main menu	Level 2	Level 3	Level 4	Description
Device setup	Process variables	Flow rate		Actual flow rate
		Totalizer		Actual totalizer value
	Diag/service	Test device	Self test	Self test parameters
			Status	Error indication
		Simulation	Default values	Values for simulation
			Start simulation	Start/stop simulation
		Calibration		Calibration parameter
		DA trim		Current output trim
		Reset device		Warm start of device
	Basic setup	TAG		TAG number
		PV unit		Unit of measured value
		Range values	PV LRV	'0'
			PV URV	Upper range value
			PV unit	Unit of measured value
			PV LSL	Lower limit for MR
			PV USL	Upper limit for MR
		Device information	Model	'ES'
			Device ID	Unique device ID
			TAG	TAG number
			Date	Calibration date
			Write protect	'NO'
			Descriptor	Description of device
			Message	Brief message
			Revision #	Revision number
		Xfer function		'Linear'
		PV damp		Time constant
	Detailed setup	Totalizer		Totalizer function on/off
		Low flow cutoff		Cutoff value in %
		Namur	MAX	MAX value in % of URV
			MIN	MIN value in % of URV
			Switch function	N1-N2, MIN-MAX, ...
		Switch		Active state open/closed
PV				Measured value
PV AO				Anaolg output (corresp.)
LRV				Lower range value
URV				Upper range value

7 Service

7.1 Maintenance

The devices were built within the scope of low maintenance but periodically the flow-meters should be inspected for signs of corrosion, mechanical wear as well as damage to the fitting and the display unit.

We advice to carry out inspections at least once a year.

For a detailed inspection and cleaning the device must be removed from the piping.

Caution!

Appropriate safety precautions have to be taken when removing the device. Always use new gaskets when reinstalling the device in the piping.

7.2 Retrofitting transducer MEM

Devices with measuring ring

For devices with standard measuring ranges starting from 5-50 l/h (gases: 0.15 – 1.5 m³/h) the float damping can be replaced by the customer:

- Remove the device from the piping.
- Fix the device, ensuring that the fitting will not be damaged.
- The damping cylinder † is fixed by retaining clamps .... Bend up these two clamps carefully using a suitable tool.
- Move the damping cylinder a little bit to the bottom end of the fitting, make a quarter turn and take the cylinder out of the fitting.
- Insert the new damping cylinder into the fitting from the top, slide it over the damping part of the float and arrange it into the retaining clamps.
- Fix the cylinder by bending the retaining clamps together.
- Fit the device back into the piping.

1 Float with damping
2 Upper guide bracket
3 Self-locking nut
4 Lower guide bracket
5 Retaining clamp
6 Damping cylinder

7.3 Returning the device to the manufacturer

This device has been carefully manufactured and tested. Should you nevertheless need to return a device to MECON GmbH please observe the following points:

Caution!

According to the actual waste disposal directives, the owner/customer is responsible for the waste management of hazardous and toxic waste.

For reasons of environmental protection and safeguarding the health and safety of our personnel all devices sent to MECON GmbH to be repaired must be free of toxic and hazardous substances. This also applies to cavities of the devices. If necessary the customer is kindly requested to neutralize or rinse the devices before returning to MECON.

The customer has to confirm this by filling in an appropriate form which is available for download on the MECON website:

www.mecon.de/en/declaration/contamination.pdf

Caution!

In the case of returning devices, despite these requirements, which contain hazardous and toxic substances, Mecon GmbH is entitled to dispose these substances at the cost of the customer without any further inquiries.

7.4 Disposal

Caution!

Disposal of the devices has to be carried out in accordance with relevant legislation in your country.

8 Technical data

8.1 Operating principle

Like other devices of this series the variable area flowmeter *RE250* operates on the principle of flotation:

The measuring unit consists of a metal tube with a measuring ring in which a float can move up and down. The movement of the float is transmitted via a magnet to a subsequent magnet which is mounted on the pointer axis.

The position of this magnet is detected by a Hall-sensor inside the integrated angle transducer MEM (sensor signals A, B) and generates a resulting output current of 4...20mA. The signal is linearised with a maximum of 16 sampling points in the process.

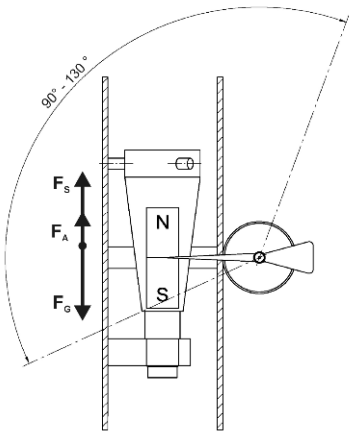

Fig. 7.1 **Operating principle of the RE250**

8.2 Technical data

General data

Range of application	Flow measurement of liquids and gases
Measuring principle	Flotation / Float measuring
Orientation	Vertical – flow direction from bottom to top

Measuring accuracy*

Directive	VDI / VDE 3513, sheet 2 (qG = 50%)
Liquids	G 1.6 (add. 0,2 %** of URV for MEM)
Gases	G 2.0 (add. 0,2 %** of URV for MEM)
Reproducibility	0,5 % of URV (add. 0,1 % of URV for MEM)

* A variation of the operating temperature to the considered temperature for the calibration process, will lead to a corresponding inherent error

** For ambient temperatures < -20 °C the measuring error will increase

Temperatures

Device version	Ambient temperature*		Storage temperature	
	[°C]	[°F]	[°C]	[°F]
with 4…20 mA + HART® protocol	-40 …+70	-40…+158	-40 …+70	-40…+158
with 4…20 mA + HART® + binary outputs	-40 …+70	-40…+158	-40 …+70	-40…+158

*** Danger!**

For applications in hazardous areas it is mandatory that the temperature class of the type examination certificate (protection type) will be regarded additionally.

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation!

RE250 with current output 4 ...20 mA and HART® protocol

Cable gland	M20 x1.5
Terminal connection	2.5 mm²
Auxiliary supply voltage U_B	14 V ... 30 V DC
Measuring signal	4 ... 20 mA = 0 ... 100% flow value in 2-wire technology
Power supply influence	< 0.1 % of MV
Max. external load R_B	680 Ω (30 V) $R_B = (U_B - 14V) / 22$ mA
Min. external load R_B	250 Ω
Temperature influence	< 10 µA / K
Min. power supply	19.5V DC
HART protocol revision	5.0
Device revision	1

RE250 with current output 4...20 mA and HART® protocol + binary outputs

Supplements to technical data for RE250 with current output 4 ... 20 mA:

Binary outputs	
Switching function	**NAMUR (EN 60947-5-6:2000)**
Max. voltage	**30 V DC**
Max. power consumption	**100 mW**
Current on state OPEN	**typ. 0.4 mA**
Current on state CLOSED	**typ. 4 mA**
Pulse output	
Max. Rate	**10 Hz**
Pulse width	**approx. 50 ms**

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